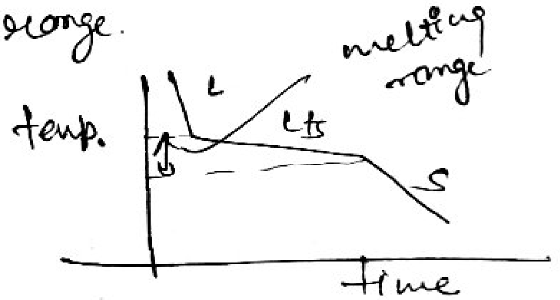
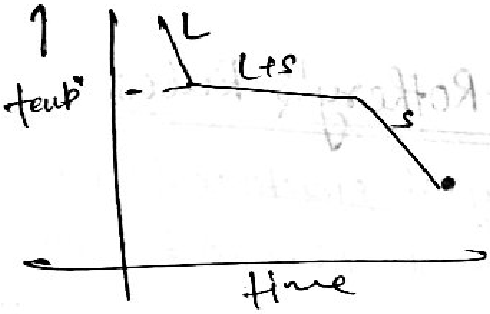
Solid sol^n	Compounds
I. made of wt% basis	I. made on molor volume or voloney basis.
~~$2H_2 + O_3 \rightarrow 2$~~ No formulla	$2H_2O + O_2 \rightarrow 2H_2O + OH$ $Na^+ + Cl \rightarrow NaCl$ Can be written as formulla.
III. Solution Con cn. is variable	III. Molar Vol. ratio remain fixed.
(IV) They are indicated by greak letters in microstrure and phase diag.	(IV)
(V) Solid sol^n melt are solidifies over a range of temp. known as melting range of freezing range. 	(V) Compound melt or solidifies at const. temp. like pure metal. 
(VI) They are formed due to mutual dislution of two elements.	(VI) Compound are formed due to a chemical reaction b/w the two elements.
(VII) Solid sol^n are addresed by "MINOR ELEMENT IN MAJOR ELEMENT" Ex: α-ferrite is a solid sol^n of Carbon in iron. γ-Austenite " " " " Fe.	(VII) Compounds are addressed by "Major element and minor element" Ex: Fe_3C → Is an interstatical compound of Fe and C. Mg_2Pb → Is an intermattalic " " Mg and Pb.

Solid sol^n Strengthening

* Solid sol^{ns} → are sol^{ns} in solid state.
* It consist of ~~solvent and~~
  - → solvent
  - → Solute (Impurity)

* Two type of solid sol^n exist they are interstatical solid sol^n and substitutionl solid sol^n
* Solid sol^n are singlephase alloy.
* The reason for strength improvement by this tech. is. lattic distortion caused by solute impurity.
* for more significant improvement in strength the following two suggestion are made.
  - ↑es the concentration of solute.
  - ↑s the size diff^n b/w solvent and solute atoms.

Hume-Rothery's Rules:-

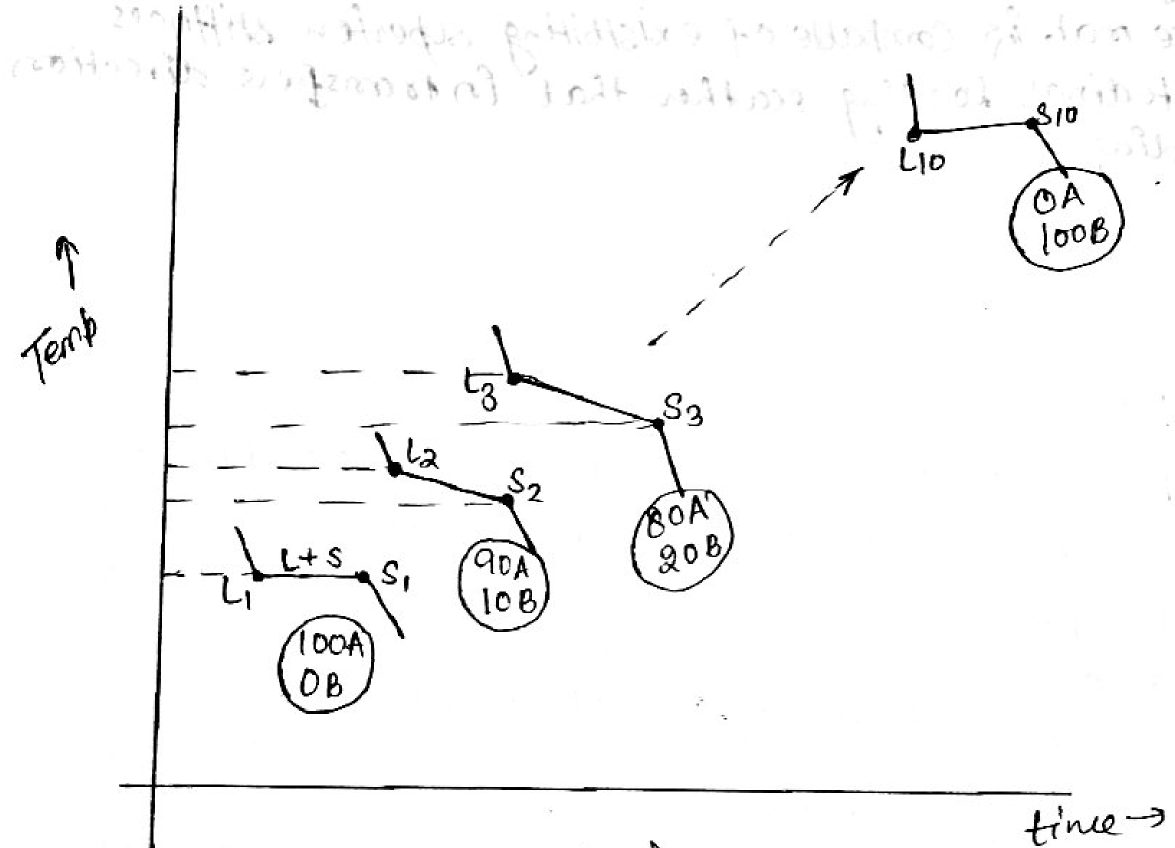
- Crystal structure factor: The crystal structure of both the element should be same.
- Relative size factor:- The diff in atomic radi b/w the two elements should be less than 15%.
- Chemical affinity factor:- The greater the chemical affinity b/w the two element more the restriced will be the soluability.
- Reative valency factor: An element of lower valency can disolve more amount of another element of higher valency, then the reverse.

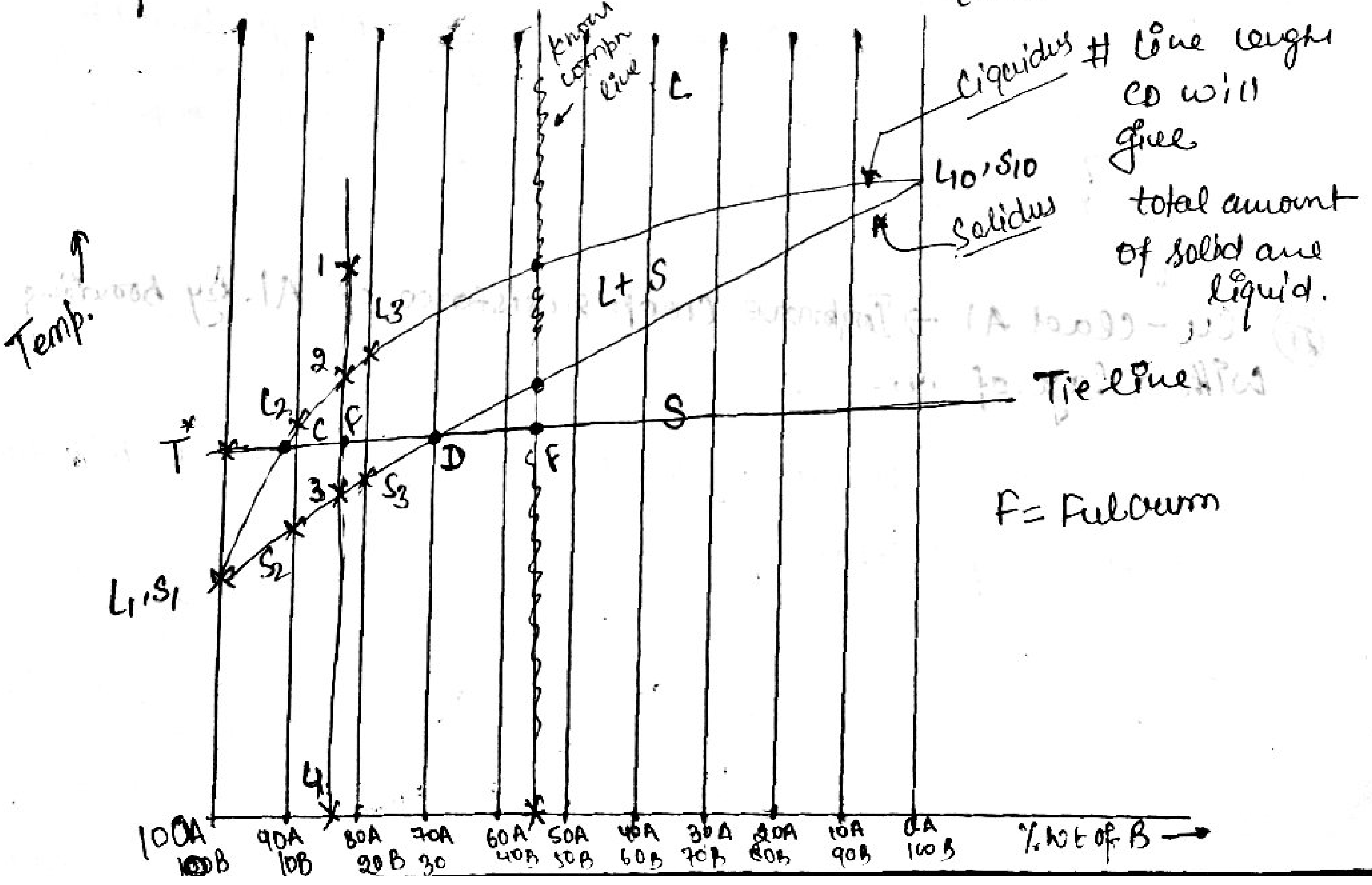
  lower valency → solvent

  higher " → solute.

Type-I :- Isomorphous System :- In this system of alloys the two elements added will exhibits complete solibility in both liquid and solid state.

Eg:- Cu-Ni System, Au-Ag system, Au-Cu, Mo-W System.





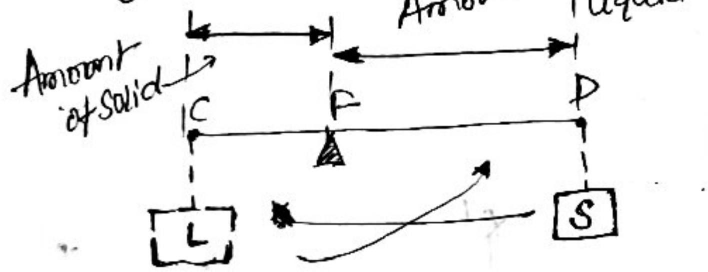
Uses:-

(I) Tie line rule:- Tie line is a horizontal line drawn at any known temp. (T^*)

Tie line rule is used for determination of composition of liquid and solid phases existing at any known temp.

(II) Lever Rule:- Lever rule is used for determination of relative amount of liquid and solid phases existing in an alloys, at any known temp.

Let x^* = any know compn.

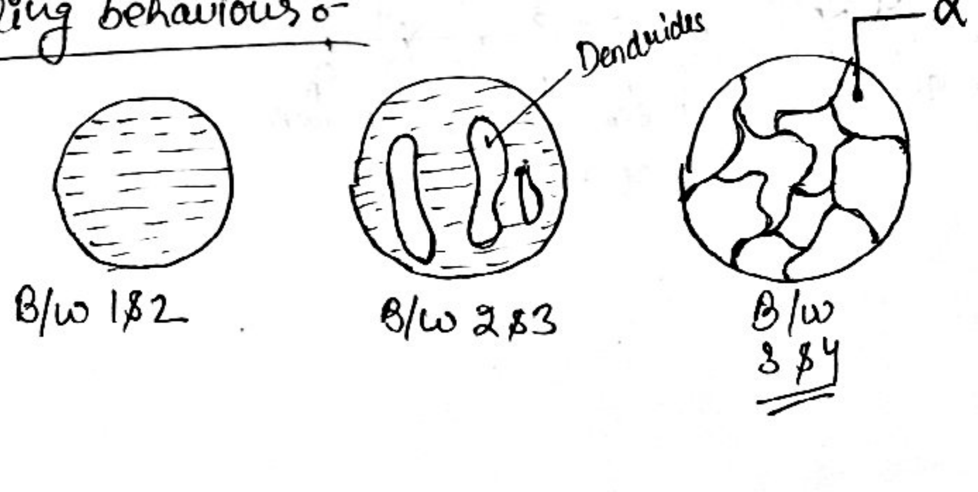


The relative amount of liquid and solid phase can be determined by moment balancing about fulcrum, when the lever is in equilibrium

Amount of solid (S)	$= \frac{CF}{CD} \times 100$
Amount of liquid (L)	$= \frac{FD}{CD} \times 100$

$L + S = 100\%$

(III) Cooling behaviours:-



Type-II :- Eutectic System: In this system of alloy the two elements added will exhibit complete solubility in liquid state and complete insolubility in solid state.

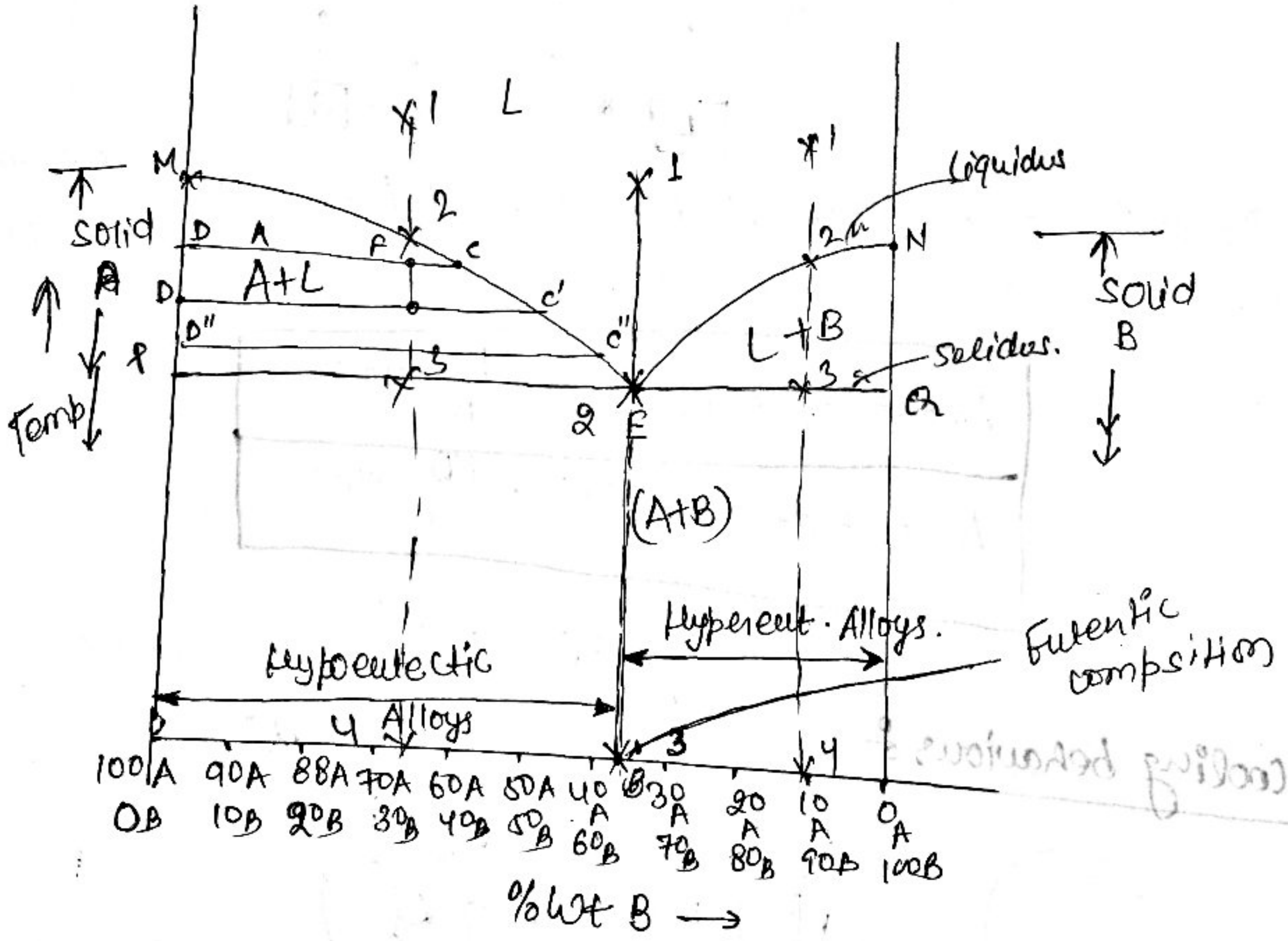
exp:-

Pb -As system, Bi-Cd, Au-Si system etc.

Let M = melting point of element 'A'.

N = " " " " 'B'.

Raoults law state that when an impurity is added to a pure metal its melting point temp. decreases.



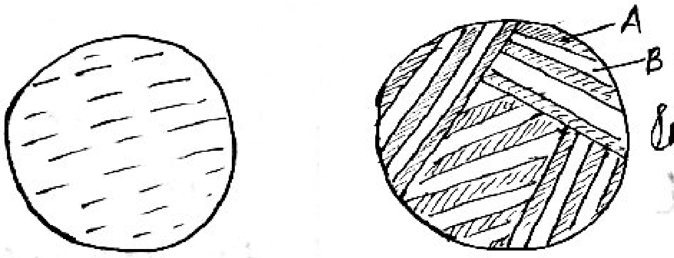
E = Eutectic [lowest melting point of Alloy]

MEN = Liquidus.

* E = freezing temp and melting point.

MPEQN = solidus.

Cooling behaviour of Eutectic Alloys:



B/w 1 & 2

B/w 2 & 3.

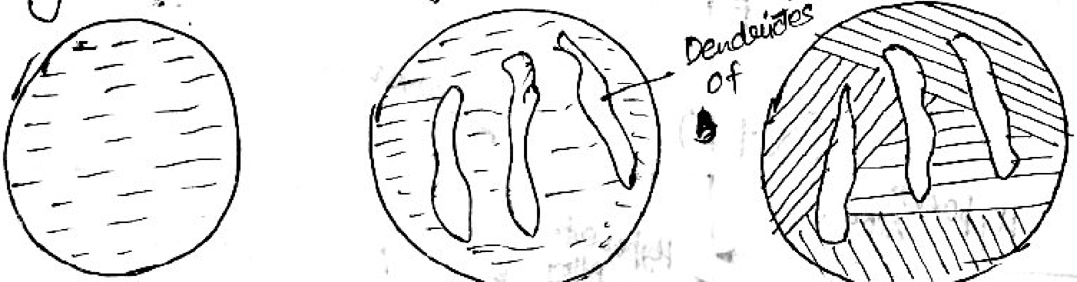
Inter lamallar Structure of A & B.

Above '2' In liquid dissolve form.

A is dissolve in B or vise versa.

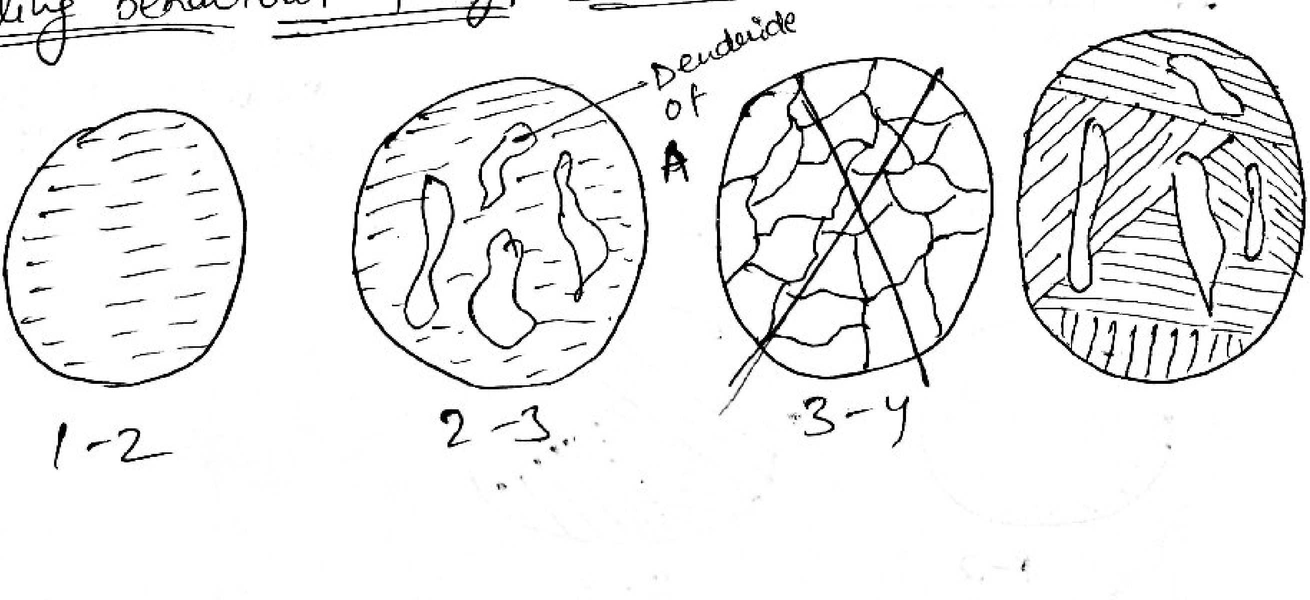
Here No dendride will form.

Cooling behaviour of ~~hypoeutectic~~ hypereutectic Alloys:



1-2 2-3 3-4

Cooling behaviour of hypoeutectic Alloys:



1-2 2-3 3-4